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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/902,429	07/10/2001	Qi Xiang	F0588	7718

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EXAMINER

SCHILLINGER, LAURA M

ART UNIT PAPER NUMBER

2813

DATE MAILED: 09/25/2002

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Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/902,429

Applicant(s)

XIANG ET AL.

Examiner

Laura M Schillinger

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 10 June 2002.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-14 and 21-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in-

(1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effect under this subsection of a national application published under section 122(b) only if the international application designating the United States was published under Article 21(2)(a) of such treaty in the English language; or

(2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that a patent shall not be deemed filed in the United States for the purposes of this subsection based on the filing of an international application filed under the treaty defined in section 351(a).

Claims 1-4, and 8-11 and 22-27 are rejected under 35 U.S.C. 102(e) as being anticipated by Kumar et al ('626).

In reference to claim 1, Kumar teaches a device comprising:

a) a central channel region comprising a first semiconductor lightly doped with a first impurity to increase first conductivity free carriers (Fig.2C (210));

b) a source region and a drain region on opposing sides of the central channel region, both source and the drain regions being the first semiconductor heavily doped with the first impurity element (Fig.2B (source and drain) See also Col.9, lines: 5-10);

c) a gate adjacent the channel region and forming a junction with the channel region, the gate comprising the first semiconductor and a second semiconductor with an energy gap greater

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than the first semiconductor and being doped with a second impurity element to increase carriers of the opposite conductivity as the first free carriers (Fig.2B (21) and Col.5, lines: 10-15).

### ***Response to Arguments***

Applicant's arguments filed 7/15/02 have been fully considered but they are not persuasive. Applicant argues on Page 5 of Paper No.4 that Kumar does not teach Applicant's claim language because Kumar teaches an EEPROM with a floating back gate for charge storage as opposed to his figure 2a which shows that the back gate MAY be coupled to circuitry as opposed to floating. Applicant's argument is not persuasive because, "the name of the game is the claim." *In re Hiniker Co.*, 150 F.3d 1362, 1369, 47 USPQ2d 1523 (Fed. Cir. 1998). The Examiner must provide showing of anticipation between prior art and the claim language. When interpreting a claim, words of the claim are generally given their ordinary and customary meaning, unless it appears from the specification or the file history that they were used differently by the inventor. *See Carroll Touch, Inc. v. Electro Mechanical Sys., Inc.*, 15 F.3d 1573, 1577, 27 USPQ2d 1836, 1840 (Fed. Cir. 1993). The Applicant relies on his figures to argue that his back gate MAY be coupled to circuitry, his argument suggests that his back gate ALSO MAY not be coupled. In any event, the Applicant's claim language is silent as to being coupled to circuitry, and compounding this problem- Col.6, lines: 60-68 Kumar teaches coupling the back gate to be operated as a back-gated device. Consequently, the Examiner's rejection is made FINAL.

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The Applicant further makes arguments pertaining to the art indicated in the prior art. However, such arguments are unresponsive to the rejection at hand in this stage of the prosecution of the application.

In reference to claim 2, Kumar teaches further including a backgate adjacent the channel region and on an opposing side of the channel region from the gate, and forming a junction with the channel region, the backgate comprising the first semiconductor and a second semiconductor with an energy gap greater than the first semiconductor and being doped with a second impurity element to increase carrier of the opposite conductivity as the first free carriers (Fig.2B(21) and Col.4, lines: 45-65).

In reference to claim 3, Kumar teaches wherein the first semiconductor is silicon (Col.4, line: 60).

In reference to claim 4, Kumar teaches wherein the first conductivity free carriers are electrons and the second semiconductor is carbon and the first and second form a silicon carbide crystal structure (Col.4, lines: 60-65).

In reference to claim 8, Kumar teaches a device comprising:

a) an insulating oxide layer separating a device layer of semiconductor material from a bulk semiconductor base region (Col.5, lines: 25-30);

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b) a generally rectangular central channel region within the device layer semiconductor material doped with a first impurity element to increase first conductivity free carriers (Fig.2C (210));

c) a source region and a drain region on opposing sides of the generally rectangular central channel region, both the source and drain comprising the device layer semiconductor material heavily doped with the first impurity element (Fig.2B (source and drain) See also Col.9, lines: 5-10);;

d) a gate adjacent the channel region and extending along a side of the central channel region adjacent the source and forming a junction with the channel region, the gate comprising the device layer semiconductor and a second semiconductor with an energy gap greater than the device layer semiconductor and being doped with a second impurity element to increase carrier so the opposite conductivity as the first free carriers (Fig.2B (21) and Col.5, lines: 10-15).

In reference to claim 9, Kumar teaches further including a backgate adjacent the channel region and on an opposing side of the channel region form the gate, and forming a junction with the channel region, the backgate comprising the first semiconductor and a second semiconductor with an energy gap greater than the first semiconductor and being doped with a second impurity element to increase carrier of the opposite conductivity as the first free carriers (Fig.2A (21) and Col.4, lines: 45-65).

In reference to claim 10, Kumar teaches wherein the first semiconductor is silicon (Col.4, line: 60).

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In reference to claim 11, Kumar teaches wherein the first conductivity free carriers are electrons and the second semiconductor is carbon and the first and second form a silicon carbide crystal structure (Col.4, lines: 60-65).

In reference to claim 22, wherein the gate extends the entire length of the channel region between the source and drain(Fig.2D (gate)- showing the top view where the gate extends over the region between the source and drain- which is the channel as shown in cross-section view Fig.2C) ..

In reference to claim 23, further including a back gate adjacent the channel region, extending the entire length of the channel region between the source and drain regions, on an opposing side of the channel region from the gate (See Fig.2C (24)), and forming a junction with the channel region, the backgate comprising the first and second semiconductor with an energy gap greater than the first semiconductor and being doped with the second impurity element to increase carriers of the opposite conductivity as the first free carriers (Col.4, lines: 45-65).

In reference to claim 24, Kumar teaches further including a conductive via electrically coupling the gate to the back gate (Fig.2A).

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In reference to claim 25, Kumar teaches wherein the gate extends the entire length of the channel region between the source and drain (Fig.2D (gate)- showing the top view where the gate extends over the region between the source and drain- which is the channel as shown in cross-section view Fig.2C) .

In reference to claim 26, Kumar teaches further including a back gate adjacent the channel region, extending the entire length of the channel region between the source and drain regions, on an opposing side of the channel region from the gate (See Fig.2C (24)), and forming a junction with the channel region, the backgate comprising the first and second semiconductor with an energy gap greater than the first semiconductor and being doped with the second impurity element to increase carriers of the opposite conductivity as the first free carriers (Col.4, lines: 45-65).

In reference to claim 27, Kumar teaches further including a conductive via electrically coupling the gate to the back gate (Fig.2A).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.



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Claims 5 and 12; 6 and 13; and 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kumar et al ('626) as applied to claims above, and further in view of Yamazaki et al ('887).

In reference to claims 5 and 12, Kumar fails to explicitly teach wherein the first conductivity free carriers are electrons and the second conductivity free carriers are holes. However, Yamazaki teaches doping with Arsenic to form an N-type region (carriers are electrons) [Yamazaki –Col.4, lines: 10-16] for an NTFT and a channel doping with Boron which is a P-type region (carriers are holes) [Yamazaki- Col.4, lines: 15-25]. It would have been obvious to one of ordinary skill in the art to modify Kumar's teachings to include Yamazaki's doping steps because Kumar teaches to dope the source and drain regions (Col.9, lines: 5-10) and Yamazaki teaches doping to correspond to a NTFT, and the type of dopants provided are a matter of choice to formulate either a NTFT or PTFT. Furthermore, the method of doping to form the channel, source and drain and very well-known in the art.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

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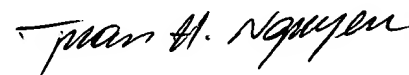
the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Laura M Schillinger whose telephone number is (703) 308-6425. The examiner can normally be reached on M-F 7:00 -4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1500.

LMS  
September 20, 2002



Tuan H. Nguyen  
Primary Examiner